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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
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EXAMINER

OLSEN, KAJ K

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PAPER

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Office Action Summary	Application No. 10/806,387	Applicant(s) YAMAMOTO ET AL.	
	Examiner KAJ K. OLSEN	Art Unit 1795	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 27 February 2008.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-8 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1-8 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
 2. ☐ Certified copies of the priority documents have been received in Application No. _____.
 3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- | | |
|--|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input type="checkbox"/> Interview Summary (PTO-413) |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | Paper No(s)/Mail Date. _____ |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO/SB/08) | 5) <input type="checkbox"/> Notice of Informal Patent Application |
| Paper No(s)/Mail Date _____ | 6) <input type="checkbox"/> Other: _____ |

DETAILED ACTION

Claim Rejections - 35 USC § 103

1. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

2. Claims 1-4 are rejected under 35 U.S.C. 103(a) as being unpatentable over Nakae et al (USP 6,340,419) in view of Garvie et al (USP 4,067,745) or King ("Chemical Polish and Strength of Alumina", Materials Science Research, 1966, pp. 529-538). In this modified rejection, King replaces the previous use of Scott. King is the article cited by Scott (col. 1, ll. 57-63) that formed the basis for the use of Scott in the previous rejection.

3. Nakae discloses a gas sensor element comprising a sensor portion having a solid electrolyte member 100 with first and second surfaces having electrodes (11, 12) mounted thereto. Nakae also discloses a heater member having a heating element 160 and one and other surfaces where said sensor portion is integrally laminated on one surface of the heater member and where the other surface of the heater member is contactable to the target gas. See fig. 1 and 2; col. 4, ll. 25-35; and col. 5, ll. 33-50. Nakae does not explicitly disclose that the other surface of the heater member, which is constructed out of alumina, has the specified average roughness. Both Garvie and King teach that polished alumina surfaces have greater mechanical strength than unpolished alumina and increase the lifetime of devices constructed with the alumina. See Garvie, fig. 7 and col. 6, ll. 27-40 and King, tables I and II and the text on p. 537. It would have

Art Unit: 1795

been obvious to one of ordinary skill in the art at the time the invention was being made to utilize the teaching of either Garvie or King and polish the exposed alumina surface (i.e. the other surface) of Nakae so as to improve the mechanical strength of the underlying alumina surface.

With respect to the average roughness being no more than 1.71 microns, finding the appropriate level of polishing to arrive at the desired level of strengthening requires only routine skill in the art. It is noted that Garvie indicates that the strengthening continually improves the as a function of the smoothness of the alumina (see fig. 7) thereby motivating one to utilize an extremely fine polishing (i.e. polishing until the surface roughness is less than 1.71 microns).

4. With respect to the at least part having the specified surface roughness being no less than 90 percent of all of the area of the other surface, it would have been obvious to one of ordinary skill in the art at the time the invention was being made to polish all of the bottom surface of Nakae so as to garner the complete strengthening effect that polishing has. Furthermore, because the other surface of Nakae is planar (see fig. 1), polishing the entire bottom surface would be as easy as polishing only a portion of the surface.

5. With respect to the other external surfaces of the heater member, polishing the other lateral surfaces of elements 15 and 16 of Nakae would allow the side surfaces to be strengthened as well.

6. Claims 1, 2, 4, and 7 are rejected under 35 U.S.C. 103(a) as being unpatentable over Nakae in view of Hata et al (USP 7,108,827).

7. Addressing claim 7 first, Nakae discloses preparing a sensor portion having a solid electrolyte member 100 with first and second surfaces having electrodes (11, 12) mounted thereto. Nakae also discloses preparing a heater member having a heating element 160 and one

Art Unit: 1795

and other surfaces, laminating the sensor portion to the heater portion and firing the integrally laminated sensor portion and heater member. See fig. 1 and 2; col. 4, ll. 25-35; col. 5, ll. 33-50; and col. 6, ll. 32-37. Nakae does not explicitly recite anything about the base member utilized for the firing step and hence doesn't disclose the use of a base member having a surface roughness of no more than 8.55 microns. Hata teaches in an alternate firing process for zirconia structures that the base members 3 that the green elements are placed upon for firing should be polished fine down to a surface roughness of less than 5 or 2 microns so that the green sheets being fired slide readily on the them while they shrink during the firing. See fig. 1 and col. 9, ll. 8-20. It would have been obvious to one of ordinary skill in the art at the time the invention was being made to utilize a base member for Nakae that is polished down to at least 8.55 microns surface roughness as taught by Hata so that the green layers of Nakae do not stick during the firing process. Although Hata only explicitly recites that the spacers 3 should be polished, because layer 3a also has green sheets placed on it like spacers 3 (see fig. 1), one possessing ordinary skill in the art would also have been motivated to polish all base member surfaces in contact with the green sheets, including members 3a and 3b of Hata, so that all surfaces of the greens sheet are permitted to freely slide.

8. With respect to claims 1 and 2, Nakae already set forth all the limitations of the claim, but did not explicitly disclose the specified surface roughness. However, as the instant invention evidences, the use of a base member having a surface roughness of less than 8.55 microns would inherently have produced an other surface for the heater member having an average surface roughness of less than 1.71 microns. See "(Second Example)" on pp. 18-20. Because Hata already rendered obvious the use of a base member with a surface roughness of less than 8.55

Art Unit: 1795

microns (see above), then Nakae prepared with such a base member would have inherently resulted in an average surface roughness of less than 1.71 microns.

9. With respect to claim 4, the use of polishing to arrive at the less than 1.71 microns constitutes the process of making the device. The determination of patentability for the claim is based on the product itself. Because the product of the claim is identical to the invention of Nakae and Hata, the process from which it was made is the same as or obvious over the process utilized by Nakae and Hata (see *In re Thorpe*, 777 F.2d 695, 698).

10. Claims 5 and 6 are rejected under 35 U.S.C. 103(a) as being unpatentable over Nakae in view of Kato et al (USP 6,156,175) and either Garvie or King.

11. Nakae discloses preparing a sensor portion having a solid electrolyte member 100 with first and second surfaces having electrodes (11, 12) mounted thereto. Nakae also discloses preparing a heater member having a heating element 160 and one and other surfaces, laminating the sensor portion to the heater portion and firing the integrally laminated sensor portion and heater member. See fig. 1 and 2; col. 4, ll. 25-35; col. 5, ll. 33-50; and col. 6, ll. 32-37. Nakae does not explicitly disclose the step of cooling the fired sensor portion. Kato discloses that a cooling step immediately follows the firing (i.e. sintering) step. See col. 12, ll. 11-36. It would have been obvious to one of ordinary skill in the art at the time the invention was being made to cool the sensor as taught by Kato so that the sensor can then be further processed before sensor installation. With respect to the step of treating the other surface of the heater member, both Garvie and King teach that polished alumina surfaces have greater mechanical strength than unpolished alumina. See Garvie, fig. 7 and col. 6, ll. 27-40 and tables I and II and the text of p. 537. It would have been obvious to one of ordinary skill in the art at the time the invention was

Art Unit: 1795

being made to utilize the teaching of either Garvie or King and polish the exposed alumina surface (i.e. the other surface) of Nakae and Kato so as to improve the mechanical strength of the underlying alumina surface. With respect to the average roughness being no more than 1.71 microns, finding the appropriate level of polishing to arrive at the desired level of strengthening requires only routine skill in the art. It is noted that Garvie indicates that the strengthening continually improves the as a function of the smoothness of the alumina (see fig. 7) thereby motivating one to utilize an extremely fine polishing (i.e. polishing until the surface roughness is less than 1.71 microns).

12. Claim 8 is rejected under 35 U.S.C. 103(a) as being unpatentable over Nakae in view of Kato, Garvie or King, and Hata.

13. Claim 8 appears to comprise the combined process limitations of claims 5 and 7 (i.e. it combines the cooling and treating of claim 5 with the base member having a surface roughness of less than 8.55 microns of claim 7). However, Nakae and Kato already set forth the process of preparing the sensor portion and heater member, firing the sensor portion and heater member, and cooling. See the rejection of claim 5 above. Hata already set forth the obviousness of utilizing a base member for firing that has been polished down to less than 5 or 2 microns surface roughness for the purpose of allowing the ceramic green sheets to freely slide on the base member during firing. See the rejection of claim 7 above. Finally, Garvie and King render obvious the use of treating (i.e. polishing) alumina surfaces so as to improve their strength. See the rejections of claims 1 and 5 above. It would have been obvious to one of ordinary skill in the art at the time the invention was being made to utilize the combined processes of both Hata and

Art Unit: 1795

Garvie or King to provide a base member that permits the fired green sheets to freely slide during firing and to provide sensor having a strengthened alumina base member.

Response to Arguments

14. Applicant's arguments filed 2-27-2008 have been fully considered but they are not persuasive. With respect to the rejection of Nakae in view of Garvie or Scott (note the examiner is relying on King instead of Scott now), applicant urges that the purpose of the present invention is not to improve the mechanical strength of the other surface of the heater member, but to cause the heater member to have a high reliability against water cracks. However, the fact that applicant uses polishing for a different purpose does not alter the conclusion that polishing in a prior art device would be *prima facie* obvious from the purpose disclosed in the references. Furthermore, "since motivation to combine prior art references need not be identical to that of Applicant in order to establish obviousness" *In re Kemps*, CAFC 40 USPQ 2d, (1996). Moreover, it has been well settled that a patent cannot be granted for an applicant's discovery of a result, even though it may be unexpectedly good, which would flow logically from the teaching of the prior art. In particular, both Garvie and King recognized that polishing alumina surfaces improved their mechanical strength, thereby providing motivation for polishing the alumina surface of Nakae.

15. Applicant further urges that Garvie and Scott do not give any guidance as to how much to polish an alumina surface down to, and hence provide no motivation to continue polishing until the ten point average roughness of the surface is no more than 1.71 μm . However, it has been well established that once the general conditions of a claim are disclosed in the prior art,

Art Unit: 1795

discovering the optimum or workable ranges involves only routine skill in the art. *In re Aller*, 105 USPQ 233. Because both Garvie and King disclose that polishing an alumina surface improves its strength, finding the degree of smoothness that provides the desired strength enhancement requires only routine skill in the art. Moreover, Garvie shows that the strength of the alumina improves with the reduced surface roughness (fig. 7) and teaches that smooth alumina surfaces are stronger because of the absence of microscopic surface flaws (col. 6, ll. 27-29), one possessing ordinary skill in the art would clearly have been motivated to utilize very fine polishing (including until the ten point surface roughness is no more than 1.71 μm), to remove as much of those flaws as is possible. In the case of King, King stresses that the polishing that is being performed results in an alumina surface that is highly reflective and the term “polish” is not utilized inaccurately. See the final two lines of p. 531. This is highly suggestive of an inherent ten point average roughness of the surface is no more than 1.71 μm . Again like with Garvie, it is microscopic defects that King is attempting to remove (see “The Nature of the Surface” on p. 531. Hence, even if King is interpreted as not anticipating the claimed surface roughness, one possessing ordinary skill in the art would have been motivated to utilize the claimed surface roughness to remove as many of those defects as possible.

16. With respect to the rejection relying on Hata, applicant traverses this rejection because the purpose of the present invention is not to improve slidability of a mount surface (as Hata teaches) but rather to cause the heater member to have a high reliability against water cracks. However, as discussed above with Garvie and Scott (i.e. King), motivation for combining two teachings need not be the same as that relied on by applicants. See *In re Kemps*, CAFC 40 USPQ 2d, (1996).

Art Unit: 1795

17. Applicant further urges that even if a person polishes the mount surface to in order to improve the slidability of the other surface, there is no obvious reason why the skilled person would be motivated to continue polishing until the roughness becomes no more than 8.55 μm . However, this argument is ignoring that Hata already suggested the use of a surface roughness of no more than 8.55 μm . In particular, Hata taught the use of 5 μm or smaller and preferably 2 μm . See col. 9, ll. 9-14.

18. With respect to the arguments concerning the use of Kato and Garvie or Scott, and Hata together, these arguments appear to stem the perceived failings of the earlier rejections. Because those arguments were not persuasive as discussed above, these further arguments are similarly unpersuasive.

Conclusion

Any inquiry concerning this communication or earlier communications from the examiner should be directed to KAJ K. OLSEN whose telephone number is (571)272-1344. The examiner can normally be reached on M-F 8:00-4:30.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Nam X. Nguyen can be reached on 571-272-1342. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Art Unit: 1795

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

/Kaj K Olsen/
Primary Examiner, Art Unit 1795
June 5, 2008